SECTION 2
ALTERNATIVES

2.0 INTRODUCTION

Section 1 identified the nature and extent of existing conditions at ESN and the proposed improvements required to keep pace with existing and future aviation activity. This section provides a description and evaluation of alternatives considered in terms of meeting the identified purpose and need for the proposed improvements at ESN. The proposed projects include: extension of Runway 4-22; construction of standard OFA for Runway 22; construction of an Airport Service Road; acquisition of property interests within the RPZ(s); construction of aircraft storage facilities; and removal of penetrations to the 14 CFR Part 77 surfaces of both Runway 15-33 and Runway 4-22.

2.0.1 ALTERNATIVES ANALYSIS METHODOLOGY

The alternatives analysis includes a range of Build Alternatives which, for the runway extension element of each option, consist of options that were identified in a previous study, entitled *Runway 4-22 Alternatives Analysis* (October 2008). In addition, a discussion of the No Build Alternative is presented. The range of alternatives developed for the proposed projects are based on requirements contained in FAA Order 5050.4B. All reasonable alternatives that could either avoid or minimize adverse impacts, or enhance the quality of the environment have been explored.

The descriptions of alternatives presented in this section include the ability to meet the purpose and need for the projects, operational impacts, and environmental considerations. In order to be considered feasible for implementation, the alternatives must take into consideration many factors. Certain development options must support the Airport's role in the aviation system and be in compliance with applicable FAA airport design standards and other regulations. In addition, the placement of runways, taxiways, and NAVAIDs must be in accordance with the standard criteria included in FAA Advisory Circular 150/5300-14. Therefore, each alternative was evaluated on its ability to maintain the requirements contained in these regulatory documents.

2.1 PROPOSED PROJECTS COMMON TO RUNWAY BUILD ALTERNATIVES

The Five-Year CIP for ESN contains several proposed projects that are unrelated to each of the proposed runway extension alternatives (see **Exhibit 2.1-1**). In order to best utilize existing ESN real estate, adhere to FAA design standards, and develop functional locations that would meet the long term needs of ESN, the proposed projects will only be considered in terms of the No Build and Build perspectives. The Build Alternative for each proposed project listed below is as proposed on the current ALP. Given the unique role of each project in meeting the Five-Year CIP development goals, it was determined to assess them cumulatively in order to facilitate the assessment of potential environmental impacts and the need for mitigation measures.

The proposed Build Alternatives for each of the runway extension alternatives, therefore, would consist of the following development projects:

- Construction of the east apron and hangar facilities;
- Construction of conventional hangars on the Southwest Apron;
- Acquisition of property interests within the Runway 15-33 protection zones;
- Construction of an Airport Service Road; and
- Removal of obstructions to the existing 14 CFR Part 77 surfaces for Runway 15-33 and Runway 4-22

2.1.1 CONSTRUCTION OF EAST APRON AND ASSOCIATED HANGARS

No Build Alternative: Under this alternative, additional T-hangars, conventional hangar, associated aprons, and connector taxiways would not be constructed. The stated purpose and need of providing needed aircraft storage and parking space would not be met. No ground disturbance or impacts to environmental resources would occur. No capital costs over and above budgeted maintenance would be incurred.

Build Alternative: In order to meet the current demand for both conventional and T-hangars and to provide adequate apron parking space, 6 12-unit T-hangar facility and a 45,750 square feet conventional hangar with associated offices/visitors area and associated aprons are proposed immediately east of Runway 22 (see **Exhibit 2.1-1**). This development would involve new construction on approximately 16.0 acres of existing grassed area. Approximately 0.8 acres of wetlands would be impacted.

2.1.2 CONSTRUCTION OF CONVENTIONAL HANGARS ON SOUTHWEST APRON

No Build Alternative: Under this alternative, no conventional hangars would be constructed and the stated purpose and need of providing needed aircraft storage would not be met. No ground disturbance or impacts to environmental resources would occur. No capital costs over and above budgeted maintenance would be incurred.

Build Alternative: In order to meet the current demand for conventional hangars, three hangars are proposed along the west side of the Southwest Apron (see **Exhibit 2.1-1**). This development would encompass approximately 1.5 acres of grassed area. No wetlands would be impacted with the hangar construction; however, a drainage swale connecting to the adjacent temporary stormwater management ponds is located within the hangar footprints. This potential impact is currently being evaluated in the Comprehensive Stormwater Management Plan that is currently being prepared. In addition, there is a current stockpile of fill dirt that would require removal and/or partial removal for construction of two of the three hangars.

2.1.3 CONSTRUCTION OF AIRPORT SERVICE ROAD

No Build Alternative: Under the No Build scenario, no Airport Service Road would be constructed and the purpose and need of providing a contiguous access road for airfield maintenance would not be met. No ground disturbance or impacts to environmental resources would occur. No capital costs over and above budgeted maintenance would be incurred.

Build Alternative: Under the Build Alternative, a, 20-foot wide by 18,760 linear foot vehicle service road would be constructed along the existing perimeter of the Airport (see **Exhibit 2.1-1**). This road would be constructed outside of all OFAs and RSAs with the exception of the perimeter roadway crossing the extended Runway 22 end OFA along the northeast corner for approximately 20 linear feet. The road would be contiguous through the perimeter of the Airport with one exception on the Runway 33 end where the roadway would connect to an existing service road that currently does encroach on the Runway 33 extended Runway OFA. The alignment of the southern portion of this service road would vary with each proposed Runway 4-22 extension Build Alternative. The current road alignment is based upon the runway configuration contained on the current ALP; should that runway extension alternative not be selected, the southern portion of this service road would need to be realigned.

As currently depicted on the ALP, the Airport Service Road would impact approximately 0.8 acres of wetlands.

2.1.4 REMOVAL OF OBSTRUCTIONS: EXISTING RUNWAY 15-33 14 CFR PART 77 SURFACES

No Build Alternative: Under the No Build Alternative, obstructions to the existing Runway 15-33 14 CFR Part 77 surfaces would remain and the purpose and need of meeting the FAA design standards would not be met. No ground disturbance or impacts to environmental resources would occur. A potential loss of approach minimums and/or a shortening of the usable pavement could also be incurred. In addition, under the No Build Alternative, the Airport would not be in compliance with their Grant Assurances.

Build Alternative: Under the Build Alternative, approximately 43 acres of trees and approximately 10 man-made objects that have been identified as obstructions to the existing 14 CFR Part 77 surfaces of Runway 15-33 would be removed (see **Exhibit 2.1-1)**. Approximately 4.9 acres of the obstructions are located in wetlands and approximately 32.4 acres are located within Delmarva Fox Squirrel (DFS) habitat.

2.1.5 REMOVAL OF OBSTRUCTIONS: EXISTING RUNWAY 4-22 14 CFR PART 77 SURFACES

No Build Alternative: Under the No Build Alternative, obstructions to the existing Runway 4-22 14 CFR Part 77 surfaces would remain and the purpose and need of meeting the FAA design standards would not be met. No ground disturbance or impacts to environmental resources would occur. A potential loss of approach minimums and/or a shortening of the usable pavement could also occur. In addition, under the No Build Alternative, the Airport would not be in compliance with their Grant Assurances.

Build Alternative: Under the Build Alternative, approximately 25 acres of trees have been identified as obstructions to the existing 14 CFR Part 77 surfaces of Runway 4-22 would be removed (see **Exhibit 2.1-1**). Approximately 6.5 acres of wetlands would be impacted. No DFS habitat would be impacted.

It should be noted that an additional 13 acres of trees were previously identified as obstructions to the existing 14 CFR Part 77 surfaces of Runway 4-22 and are under grant for removal. These obstructions were previously evaluated in an EA entitled *Clearing FAR Part 77 Airport Surfaces*, dated 2003.

2.1.6 ACQUISITION OF PROPERTY INTERESTS - RUNWAY 15-33 RPZ

No Build Alternative: Under the No Build Alternative, non-Airport owned property located within the RPZs of Runway 15-33 would not be acquired. Current FAA standards regarding airport control of properties located within the RPZ would not be met.

Build Alternative: Under the Build Alternative, approximately 0.2 acres of a 313-acre parcel adjacent to the Airport is within the Runway 15 end RPZ would either need to be acquired via fee simple acquisition or have development on it restricted via acquisition of an avigation easement. It should be noted that although the FAA prefers that the Airport control the use of development on parcels within the RPZ through fee-simple acquisition, the entire parcel in which this 0.2-acre portion is located is currently under a conservation easement which significantly limits development.

Portions of four parcels totaling approximately 0.7 acres are located within the Runway 33 RPZ (see **Exhibit 2.1-1**). The required portions of three of these parcels within the Runway 33 RPZ currently do not contain any structures; the RPZ encroaches upon a building on the fourth remaining parcel.

2.2 RUNWAY EXTENSION ALTERNATIVES

As discussed in **Section 1.1.4**, additional planning services were required to revisit alternatives involving an extension to Runway 4-22, which were initially evaluated in the RSA Study completed in 2003. As a result, the *Runway 4-22 Extension Analysis* was completed in 2008 involving six initial runway length alternatives (see **Appendix D**). A two-tier evaluation process was used in this analysis. The purpose of the Tier 1 evaluation was to reveal any "fatal flaws" which would immediately eliminate a particular alternative from further detailed consideration. The Tier 1 criteria process involved assessing each of the original six alternatives in light of their ability to adequately comply with the following restrictive FAA criteria with minimal off-Airport effects:

- Runway Visibility Zone (RVZ);
- Roadway Clearance (14 CFR Part 77 requirements);
- ATCT Visibility;
- Primary Surface; and
- Localizer Critical Area.

Three alternatives (Alternatives 1, 2, and 5) successfully met all five Tier 1 evaluation criteria and were recommended for further Tier 2 analysis, which included:

- Environmental considerations (wetlands, DFS habitat, and compliance to the Maryland Forest Conservation Act);
- Runway length requirements;
- Land acquisition needs;
- Part 77 obstruction considerations; and
- Compatibility with other Airport projects.

Alternatives 3, 4, and 6 did not meet Tier 1 criteria and, therefore, were not recommended for further Tier 2 analysis. Alternative 3 provided a 6,000-foot runway and incorporated an Engineered Materials Arresting System (EMAS) on the Runway 22 end. However, Old Centreville Road was an obstruction to the approach surface to the Runway 22 end. Alternative 4 provided a 6,800-foot runway through the use of declared distances on both runway ends; however, Old Centreville Road was an obstruction to the approach surface to the Runway 22 end. Alternative 6 provided a 7,396-foot runway through the use of declared distances on both runway ends; however, the approach surface on the Runway 22 end did not clear Old Centreville Road or US Route 50 by 15 feet, thereby making both roads obstructions.

All of the Build Alternatives addressed in this section include the installation of a Medium-Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). This type of approach lighting system is installed in the runway approach zone along the extended centerline of the runway and consists of a combination of threshold lamps, steady-burning light bars, and flashers. The system provides visual information to pilots on runway alignment, height perception, role guidance, and horizontal references for performing Category I Precision Approaches. A typical MALSR system is 2,400-foot in length and consists of 7 approach light bars and 5 Runway Alignment Indicator Lights for a total of 12 total light units that begin at a point 200 feet off of the runway approach threshold and continuing out into the runway approach with a 200-foot standard separation between each unit. The fifth approach light bar along the system, which is located 1,000 feet off the approach threshold, also contains additional light bars offset 28 feet transversely to each side of the extended runway centerline.

The Airport Layout Plan Update prepared in 2006 determined that 5,500 feet, which is the current length of Runway 4-22, is inadequate to accommodate the large aircraft fleet using the runway. The critical aircraft required a minimum of 6,900 feet based on 90 percent useful load. Although 6,900 feet of useable runway length was the recommended design criteria for the primary runway at ESN, Glebe Road, Old Centreville Road, and US Route 50 limited the expansion possibilities. Therefore, every effort was made to provide the maximum runway length during the alternatives analysis.

The subsections which follow discuss in detail the alternatives that were evaluated in the Tier 2 Analysis (Alternatives 1, 2, and 5). Alternatives 3, 4, and 6 can be reviewed in **Appendix D**.

2.2.1 ALTERNATIVE 1: 5,600-FOOT RUNWAY

Alternative 1 would extend Runway 4-22 to 5,600 feet and not require the use of declared distances (see **Exhibit 2.2-1**). The Runway 4 end, which would be extended 1,100 feet, requires a precision RPZ that extends to the south side of the Glebe Road right-of-way. This is the farthest the Runway 4 end RPZ could be extended without requiring the acquisition of businesses located just to the south of Glebe Road that would be within the associated RPZ. The Runway 22 end would be relocated 1,000 feet in order to achieve the required 1,000 foot RSA and OFA, and thus avoiding Old Centreville Road. The RSA and OFA for this alternative would meet all FAA design criteria.

Alternative 1 would impact approximately 13.8 acres of wetlands, 656 linear feet of waters of the US, and 32.4 acres of DFS habitat. In addition, approximately 63.1 acres of obstructions (trees, ground, and brush) would result.

With the implementation of Alternative 1, 8 privately owned parcels (60.2 acres) are located within the RPZ.

This Alternative would provide a runway length of 5,600 feet and therefore, does not meet the purpose and need of providing an adequate runway length identified in the previous Master Plan Update. The runway length requirements for critical aircraft operating at ESN range from approximately 6,030 feet for the Gulfstream IV to 6,900 feet for the Hawker 700.

2.2.2 ALTERNATIVE 2: 6,400-FOOT RUNWAY – DECLARED DISTANCES ON RUNWAY 4 END

Alternative 2 would provide a 6,400 foot runway through the use of declared distances on the Runway 4 end. The Runway 4 end would be extended 1,896 feet with an 800 foot displaced threshold. The 1,100 feet of pavement before the displaced threshold would be available for use during takeoff. The Runway 22 end would be relocated 1,000 feet in order to create a 1,000 foot RSA and OFA off the Runway 22 end. Through the use of declared distances, 6,400 feet would be available for takeoff on Runway 4 and 22, 6,400 feet would be available for landing on Runway 22, and 5,600 feet would be available for landing on Runway 4 (see **Exhibit 2.2-2**)**.** The RSA and OFA for both runways ends would meet FAA design criteria.

Alternative 2 would impact approximately 14.2 acres of wetlands and 32.4 acres of DFS habitat. In addition, approximately 68 acres of obstructions (trees, ground, and brush) would result. Of the 68 acres of tree obstructions, 31 acres are located on Airport owned property. The remaining obstructions are located on 33 privately-owned parcels requiring an avigation easement.

With the implementation of Alternative 2, 8 privately owned parcels (60.2 acres) are located within the RPZ.

This Alternative provides a runway length of 6,400 feet with the use of declared distances, and therefore, does meet the purpose and need of providing an adequate runway length identified in the previous Master Plan Update.

2.2.3 Alternative 5: 6,492-foot Runway – Maximizing Length Through Declared Distances

This alternative would involve the extension of the runway ends to its maximum length based upon meeting 14 CFR Part 77 requirements (see **Exhibit 2.2-3**). Alternative 5 uses declared distances while clearing all roadways by 15 feet and maintaining a 1,000 foot wide primary surface. This would create 6,492 feet of usable runway with a full RSA and OFA on both runway ends that meets FAA design criteria. The Runway 4 end would be extended 1,896 feet with a displaced threshold of 800 feet to allow for a takeoff runway available of 6,400 feet. The Runway 22 end would be relocated 908 feet. The use of declared distances would allow 6,492 feet of takeoff run available on the Runway 22 end. The landing distance available on the Runway 4 end would be 5,600 feet and 6,492 feet on the Runway 22 end.

As with Alternative 2, Alternative 5 would impact approximately 14.2 acres of wetlands and 32.4 acres of DFS habitat. In addition, approximately 68 acres of obstructions (trees, ground, and brush) would result. Of the 68 acres of tree obstructions, 31 acres are located on Airport owned property. The remaining obstructions are located on 33 privately-owned parcels requiring an avigation easement.

In addition, with the implementation of Alternative 5, 8 privately owned parcels (61.25 acres) are located within the RPZ.

This Alternative provides a runway length of 6,492 feet with the use of declared distances, and therefore, does meet the purpose and need of providing an adequate runway length identified in the previous Master Plan Update.

2.2.4 No Build Alternative

Under the No Build Alternative, the existing length of Runway 4-22 would remain at 5,500 feet. Currently, in order to provide a standard OFA for Runway 4-22, the use of declared distances has been approved as a MOS. With the implementation of declared distances, the TORA for Runway 4 would remain at 5,175 feet and the LDA for Runway 4 would remain at 4,775 feet for as long as the FAA allows for the MOS to remain (see **Section 1.1.5**). These runway lengths are significantly less than the runway length required at ESN and therefore, the stated purpose and need of providing a runway length to meet the existing needs of the design aircraft would not be met. In addition, the deficient runway lengths would continue to force existing based aircraft and current transient operators to depart ESN with less than optimal fuel and/or passenger loads.

No ground disturbance or impacts to environmental resources would occur. No capital costs over and above budgeted maintenance would be incurred.

2.2.5 SPONSOR'S PREFERRED ALTERNATIVE

As mentioned previously, a two-tier evaluation process was used in the Analysis. Alternatives 1, 2, and 5 passed all five Tier 1 evaluation criteria and were recommended to continue to Tier 2 for further analysis. On July 22, 2008, the Talbot County Council voted to evaluate Alternatives 1, 2, and 5 in the Tier 2 Evaluation. The runway alternatives were evaluated quantitatively based on these criteria using a ranking system. This system assigned a numerical ranking from 1 (lowest) to 5 (highest). After ranking each alternative relative to each criterion, the individual ranks were totaled to produce a score for the alternative. Based on the quantitative evaluation, Alternative 2 is the Sponsor's recommended runway extension alternative.

TABLE 2.2-1
RUNWAY ALTERNATIVES - TIER 2 EVALUATION MATRIX

	Alternative 1	**Alternative 2**	**Alternative 5**
Environmental Considerations	3	3	3
Runway Length (Feet)	1	4	4
Land Acquisition (Number of Parcels)	4	3	2
14 CFR Part 77 Obstructions (acres)	4	3	3
Compatibility with other Airport Projects	5	5	5
TOTAL SCORE:	**17**	**18**	**17**

Source: URS Corporation (2008).

Alternative 2 was then depicted on the ALP and submitted to the FAA for approval. The FAA approved the revised ALP in February 2009 (see **Exhibit 1.1-1**).

With implementation of the Sponsor's Preferred Alternative, the non-standard OFA of Runway 22 would be corrected as the displacement of the Runway 22 threshold would allow for a 1,000-foot OFA in length beyond the runway end.

2.3 MEET FAA DESIGN STANDARDS

Should the runway not be extended as identified in **Section 2.2.5**, the Runway 22 OFA would remain non-standard, the primary surface of the Runway 22 end would continue to extend off Airport property and encroach onto Old Centreville Road; portions of the Runway 22 RPZ would remain outside Airport property; and the existing approach surface to Runway 22 would still not clear Old Centreville Road or US Route 50 by the required 15 feet.

No Build Alternative: With implementation of the No Build Alternative, a non-standard OFA would remain at ESN for Runway 4-22, off-Airport properties would remain within the Runway 22 RPZ, and the clearance requirement of 15 feet above Old Centreville Road and US Route 50 would not be met. These conditions are not acceptable by the FAA; therefore, the No Build Alternative is not considered a feasible alternative as it does not meet the stated purpose and need.

Build Alternative: In order to correct these non-standard conditions, the threshold of Runway 22 would need to be relocated an additional 1,000 feet (see **Exhibit 2.3-1**). This would then create a 4,500-foot long Runway 4-22 that meets the 14 CFR Part 77 roadway clearance standards and has a standard OFA. With the relocation of the threshold, only two parcels within the Runway 22 RPZ would remain outside of Airport property and would require fee-simple acquisition.

With implementation of this alternative, the stated purpose and need of providing a standard OFA, Airport-controlled RPZ, and clear 14 CFR Part 77 roadway clearance would be met; however, the resultant runway length would be less than current conditions and would not meet the stated purpose and need of providing an adequate length to accommodate the existing and proposed fleet mix at the Airport.

2.4 SPONSOR'S PREFERRED ALTERNATIVE

The Sponsor's Preferred Alternative is Alternative 2. Alternative 2 would provide a 6,400 foot runway through the use of declared distances on the Runway 4 end. The Runway 4 end would be extended 1,896 feet with an 800-foot displaced threshold and the Runway 22 end would be relocated 1,000 feet.

The Sponsor's Preferred Alternative for the additional projects included in the Five-Year CIP includes the following:

- Construction of east apron and hangar facilities;
- Construction of conventional hangars on the Southwest Apron;
- Acquisition of property within the Runway 15-33 protection zones;
- Construction of an Airport Service Road; and
- Removal of obstructions to the existing 14 CFR Part 77 surfaces for Runway 15-33 and Runway 4-22.

Thus, for the remainder of this EA, the discussions for Alternatives 2 and 5 will include the respective runway extension alternative as well as the separate stand-alone projects listed above.

2.4.1 POTENTIAL ENVIRONMENTAL IMPACTS

Section 4 will present an assessment of the potential environmental impacts of Alternatives 2 and 5 along with the proposed projects listed in **Section 2.1**. **Table 2.4-1** provides a comparison of the environmental consequences of the proposed Build Alternatives.

TABLE 2.4-1
POTENTIAL ENVIRONMENTAL IMPACTS OF BUILD ALTERNATIVES

Resource Category	Alternative 2	Alternative 5
Population in 65 DNL dBA	0	0
Population experiencing a DNL 1.5 dBA within 65 DNL dBA contour	0	0
Noise sensitive sites within DNL 65 dBA	0	0
Noise sensitive sites within DNL 65 dBA experiencing a 1.5 dBA increase	0	0
Fee-simple acquisition required	92.7 acres / 10 parcels	92.7 acres / 10 parcels
Avigation easements required	13.6 acres / 41 parcels	14.4 acres / 43 parcels
Secondary (Induced) Impacts	No significant impact anticipated	No significant impact anticipated
Air Quality	No significant impact anticipated	No significant impact anticipated
Section 4(f) (# affected)	0	0
Historic and Archaeological Sites (# affected)	0	0
Farmlands (# of acres affected)	0	0
Water Quality	SWM facilities required	SWM facilities required
Coastal Resources	Consistency Determination required	Consistency Determination required
Wild and Scenic Rivers (# affected)	0	0
Floodplains	No significant impact anticipated	No significant impact anticipated
Wetlands (# acres impacted)	20	20
Maryland Forest Conservation Act	FCA compliance required	FCA compliance required
Rare, Threatened, and Endangered Species	32.4 acres of DFS habitat affected	32.4 acres of DFS habitat affected
Natural Resources and Energy Supply	No significant impact anticipated	No significant impact anticipated
Light Emissions and Visual Impacts	No significant impact anticipated	No significant impact anticipated
Hazardous Materials	No significant impact anticipated	No significant impact anticipated
Solid Waste	No significant impact anticipated	No significant impact anticipated
Construction Impacts	BMP & erosion / sediment control measures required	BMP & erosion / sediment control measures required

Source: URS Corporation, 2010.